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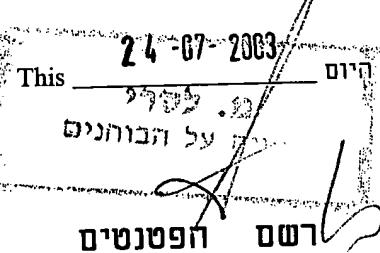
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בקשה לפטנט
Application for Patent

אני, (שם, המבקש, מענו ולגבי גוף מאוגד - מקום התאגדותו)

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בעל אמצעה מכח

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מערכת צינורות השקיה משופרת

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IMPROVED IRRIGATION PIPELINES

hereby apply for a patent to be granted to me in respect thereof.

בקשת בזאת כי ינתן עלייה פטנט

Application of Division		Application for Patent Addition		דרישת דין קדימה Priority Claim		
מספר No.	תאריך Dated	מספר No.	תאריך Dated	מספר/סימן Number/Mark	תאריך Date	מדינת האgod Convention Country
• בקשה חלוקה Application of Division		• בקשה פטנט נוסף Application for Patent Addition				
מבקשת פטנט from Application		לבקשת/לפטנט to Patent/Appl.				
מספר No.	תאריך Dated	מספר No.	תאריך Dated			
• יpoi כח : כלל/ פיזוחך - רצוף בזח/ עוד יוגש P.O.A.: general/ individual -attached/to be filed later filed in case 138196		הוגש בעניין				
המען למסירת מסמכים בישראל Address for Service in Israel		לוצאטו את לוצאטו 5352				
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מערכת צינורות השקיה משופרת

IMPROVED IRRIGATION PIPELINES

IMPROVED IRRIGATION PIPELINES

Field of the Invention

This invention relates to improved pipelines for drip irrigation, which are protected from the clogging of the bores present therein and from the ingress through said bores of undesired material, particularly growing roots.

Background of the Invention

The use of pipelines which provide irrigation by gradually dispensing water or aqueous solutions to the soil, particularly in the form of drops or at any rate in periodic small quantities, is greatly widespread both in agriculture and in gardens, orchards and the like. Said pipelines merely consist of pipes, having bores formed in their wall thickness along their lengths, by drilling or by other means, such as boring, welding etc., connected to a source of a liquid - water or a solution, generally an aqueous solution - which dispense the liquid through said bores. In many cases, such drip pipelines are laid upon the soil, to feed water or solutions of any desired substances, such as fertilizers, weed killers, pest killers and so forth, to the uppermost layers of the soil. In other cases deeper penetration of the water or solutions is desired, and for this purpose the drip pipelines are laid within the soil at a certain depth from its surface.

In any case, a considerable trouble is caused by the ingress of undesired material into the bores of the drip pipes. The undesired material may be vegetable or mineral. Particularly, roots of vegetation may gradually grow through the bores of the pipes and clog them, at least to some extent, and may continue to grow within the pipes and reduce the cross-section available for the flow of liquid. Minerals may also be sucked into the pipes because of a temporary reduction of inside pressure. These phenomena

reduce the efficiency of the pipeline as a supplier of desired liquid to the soil and often require the replacement of sections therefor. As far as the applicants know, the only means for attempting to prevent the growth of roots of vegetation into the pipes are chemical means. It must be kept in mind that drip pipelines are means for providing to the soil desired liquids, which must be very economical, particularly in view of their great extension, and that complicated and/or expensive improvements would be unacceptable.

It is therefore a purpose of this invention to provide drip pipelines that are protected against the ingress or any undesired material into the bores through which the drip action is carried out.

It is another purpose of this invention to provide means whereby existing drip pipelines may be so protected.

It is a further purpose of this invention to provide means, that are not chemical means, for preventing roots and other vegetable growths from penetrating into the bores of drip pipelines.

It is a still further purpose of this invention to provide drip pipelines the inside of which remains free from foreign materials and allows normal, unimpeded flow of liquids to be dispensed in the soil.

It is a still further purpose of this invention to provide the aforesaid results and advantages regardless of whether the drip pipeline is laid on the soil or within the soil at some depth from the surface.

It is a still further purpose of this invention to achieve the aforesaid purposes with inexpensive means, which do not require complex or difficult operations for their application.

Other purposes and advantages of the invention will appear as the description proceeds.

Summary of the Invention

The improved drip pipelines of this invention are characterized by the fact that they comprise a protection, from the ingress of roots or other undesirable material, of the bores through which liquid is dispensed to the soil. The protection is preferably in the form of a layer pervious to water, that screens at least said bores. By the expression "screens said bores" is meant herein that the layer interposed between the bores and the environment, particularly between the bores and the soil or the vegetation. Improved drip pipelines, according to the invention, comprise a pipe having bores created therein for dispensing water to the soil and a layer pervious to water applied to said pipe to screen the said bores.

Said layer is generally a fabric. Preferably, the pervious layer, and specifically the fabric, circumscribes, not tightly but loosely, the entire surface of pipeline segments, at least the surface of the segments wherein a bore or bores have been made.

The preferred pervious layer is a fabric, more preferably made of texturized polyester fibers. Preferably, the fabric has a high permeability to water. Said permeability can be determined by measuring a first amount of water, which is the amount dripped from a drip irrigation pipe, then applying a fabric sleeve to the pipe and measuring a second amount of water, which is the water filtered through the fabric sleeve. The

ratio of the second amount of water to the first can be taken as expressing the permeability of the fabric, and, according to the invention, should preferably be at least 0.95 (95 wt%). In many cases the two amounts of water are equal, viz. the fabric behaves as if its permeability is 100 wt%. Such an example will be given later on. Everything that is said in this specification and claims is to be understood as equally applying to aqueous solutions.

The fabric can be in the form of tubular pieces loosely slipped over each pipe section. However, it is preferred to make the fabric in rectangular pieces of the appropriate breadth, so that two (or more) rectangular pieces may be placed in parallel positions over and under, or at one and the other side, of the pipe, and their longitudinal edges may be juxtaposed and joined, to form a sleeve, viz. a composite, tubular structure. By length, or longitudinal dimension, of a piece is meant its dimension parallel to the axis of the pipe, and by breadth, or transverse dimension, is meant its dimension perpendicular to the longitudinal one. In this way the invention can be applied to drip pipelines *in situ*, when they are installed on the ground, or to drip pipelines that have been already installed. Of course, the length of the fabric sections, whether the fabric is tubular or is in rectangular portions which are formed into a tubular structure by joining their longitudinal edges, can be as desired, can be as long as or longer than a section of pipeline or can be only as long as a part of it, whereby sections of the pipeline can be protected by shorter pieces of fabric juxtaposed at their transverse edges or spaced from one another in correspondence to parts of the pipeline which have no bores.

Another aspect of the invention is therefore a method for making an improved pipeline for drip irrigation purposes or for the purpose of providing desired fertilizer or weed or pest killer material to the soil, which comprises providing pipe sections,

made by conventional techniques and having holes created in their wall thickness at any desired points, and a) as a first alternative, juxtaposing to each pipe section a rectangular piece of fabric, folding said piece of fabric over said pipe so as to juxtapose its longitudinal edges, and connecting said edges in any convenient way, e.g., by stitching or welding if the fabric is thermoplastic; or b) as a second alternative, juxtaposing to each pipe section two parallel rectangular pieces of fabric, bending said pieces of fabric over said pipe so as to juxtapose their longitudinal edges, and connecting said edges in any convenient way, e.g., by stitching, welding if the fabric is thermoplastic, or in any other suitable manner. In said second alternative, of course, more than two rectangular pieces of fabric could be used, but this would a less convenient embodiment of the invention. As a variation, in said first alternative, a strip of any convenient material can be placed over said longitudinal edges, which in this case need not necessarily be juxtaposed but may only be sufficiently close to one another, and then said strip may be longitudinally connected to the fabric to connect or retain its longitudinal edges in close positioned relationship and to cover the gap between them; and a similar variation could be made to said second alternative. Generally, the fabric or fabric pieces entirely surround the pipe and therefore form what can be called and has been called a "sleeve". It is not excluded that a part of the pipe surface, in which no bores exist, could remain uncovered by the fabric, by this does not occur in the preferred embodiments.

Another aspect of the method is the provision of protection to already laid drip pipelines, by applying, to each of a number of pipe sections, rectangular pieces of fabric as described hereinbefore, juxtaposing their longitudinal edges, and connecting said edges in any convenient way.

The fabric sleeves for protecting drip irrigation pipes and the use of a fabric for making sleeves for protecting such pipes are also aspects of the invention.

Brief Description of the Drawings

In the drawings:

- Fig. 1 shows in perspective view a portion of pipe on which a piece of fabric is partially and loosely wound;
- Fig. 2 is a perspective, end view of a pipe covered by a sleeve formed by two longitudinal, rectangular fabric pieces, interconnected by stitching;
- Fig. 3 is a perspective view showing several pipes covered by sleeves in a manner similar to that shown in Fig. 2;
- Fig. 4 is a perspective side view showing a pipe partly covered by fabric as in Fig. 2; and
- Fig. 5 is a schematic cross-section of a pipe such as that of Fig. 2.

Detailed Description of Preferred Embodiments

With reference to Fig. 1, numeral 10 designates a segment of a pipe for drip irrigation which comprises a bore 11. It should be understood that, when reference is made herein to "pipes for drip irrigation", this is meant to include pipes that deliver aqueous solutions for any purposes, viz. any pipes having bores therein through which water or an aqueous solution is delivered to the soil or to vegetation. A fabric 12 is partly wound about the pipe with its edges 13, 13' being separated because the fabric has been wound only loosely.

Fig. 2 shows a pipe 15 around which is loosely placed a fabric sleeve consisting of two longitudinal pieces 16 and 16' stitched together at 17 and 17'. A gap 18 is left between the pipes and the fabric.

In Fig. 3 the same pipe 15 of Fig. 2 is shown, together with two pipes 20 and 21 placed side by side and covered by one fabric sleeve 22.

Fig. 4 shows a pipe 25 partly covered by a sleeve 26 in the same way shown in Fig. 2, though said sleeve is in a vertical position and not in a horizontal one as in Fig. 2.

Fig. 5 schematically shows a cross-section of a pipe 30 loosely covered by a sleeve consisting of rectangular pieces 31 and 32 connected at 33 and 34 in any convenient way. A bore 36 is shown at the bottom of the pipe. The sleeve is shown as coaxial with pipe 30, leaving a gap 35 from the pipe, but in practice the sleeve may dispose itself in any non-coaxial and non-symmetrical position as dictated by the way in which the pipe is laid. If the pipe rests on the ground, its lower surface will contact the piece 31. If is spaced from the ground, the piece 32 will rest on the upper surface of pipe 30. The sleeve can also be positioned vertically, viz. with the connections 33 and 34 located one below and the other above the pipe, or at any angle to the vertical.

Examples of drip pipelines that can be improved by this invention comprise pipelines having sections of length up to 500 meters, inner diameter from 4 to 25 cm, wall thickness from 100 to 1200 microns, and made from a metal or a plastic matter such as polypropylene. Bores are formed in the pipeline, e.g. by drilling or otherwise, in the number of from 1 to 10 per meter of length. The fabric applied to said pipeline is made of polyester having a very high permeability. Examples of convenient fabrics are offered by compact fabrics, textiles, geotextiles, tarpaulin, polypropylene, but

other fabrics may be found convenient. In any case, the fabric must not excessively decrease the amount of water that is dripped by the pipeline, preferably must not decrease it by more than 5% by weight. The fabric may be dyed or coated, as long as this does not excessively decrease the amount of water that filters through it. A particular example is a fabric of 100% textured polyester fibers, wherein the warp yarns have a count of 300 dtex and the weft yarns have a count of 450 dtex, said fabric having a number of yarns per centimeter of 30 in the warp and 15 in the weft, a thickness of about 5 mm and a breaking strength of about 45 KGF.

In a particular example, a drip irrigation pipe having a length of 10 meters and bores distant 20 cm from one another, viz. 50 bores in all, was fed with water at 1 atm. and the bores delivered 2 lt/hr. A fabric sleeve, as hereinbefore described, was applied to it, and was quite sufficient to prevent the entrance of roots or other undesired material through the pipe bores. The pressure within the sleeve, viz. in the gap between it and the pipe, was 0.2 atm. The same amount of water that was dripped in the absence of the fabric, viz. 2 lt/hr, filtered through the fabric, which had therefore 100 wt% permeability. It was clear that larger amounts of water could also filter through the fabric sleeve, if delivered by the drip pipe.

While embodiments of the invention have been described by way of illustration, it will be apparent that the invention may be carried out with many modifications, variations and adaptations, without departing from its spirit or exceeding the scope of the claims.

CLAIMS

1. Improved drip pipelines, comprising a pipe having bores created therein for dispensing water to the soil, and a layer pervious to water applied to said pipe to screen the said bores.
2. Pipelines according to claim 1, wherein the layer pervious to water is a fabric sleeve.
3. Pipelines according to claim 2, wherein the pervious layer screens at least the surface of the segments of the pipeline wherein a bore or bores have been drilled.
4. Pipelines according to claim 2, wherein the fabric is textured polypropylene.
5. Pipelines according to claim 2, wherein the fabric has a permeability to water of at least 0.95.
6. Pipelines according to claim 2, wherein the fabric sleeve consists of rectangular pieces having their long edges juxtaposed and joined.
7. Pipelines according to claim 5, comprising pipes having sections of length up to 500 meters, inner diameter from 4 to 25 cm, wall thickness from 100 to 1200 microns, bores drilled therein in the number of from 1 to 10 per meter of length.

8. Method of making an improved drip pipeline, which comprises providing pipe sections having drilled holes and applying to said pipe sections a sleeve of fabric.

9. Method according to claim 8, wherein the sleeve of fabric is produced by juxtaposing to each pipe section a rectangular piece of fabric, folding said piece of fabric over said pipe section so as to juxtapose its longitudinal edges and connecting said edges.

10. Method according to claim 8, wherein the sleeve of fabric is produced by juxtaposing to each pipe section a plurality of rectangular pieces of fabric, juxtaposing the longitudinal edges of said pieces and connecting said edges.

11. Method of protection of already laid drip pipelines, which comprises applying a sleeve of fabric to each of a number of pipe sections, wherein said sleeve of fabric is created by the method of claim 9 or of claim 10.

12. Improved drip pipelines, substantially as described and illustrated.

11. Method of making an improved drip pipeline, substantially as described and illustrated

12. Method of protection of already laid drip pipelines, substantially as described and illustrated.

13. Water-pervious and root- impervious fabric sleeves for the protection of drip irrigation pipelines.

14. Use of a water-pervious and root- impervious fabric for making fabric sleeves for the protection of drip irrigation pipelines, substantially as described and illustrated.

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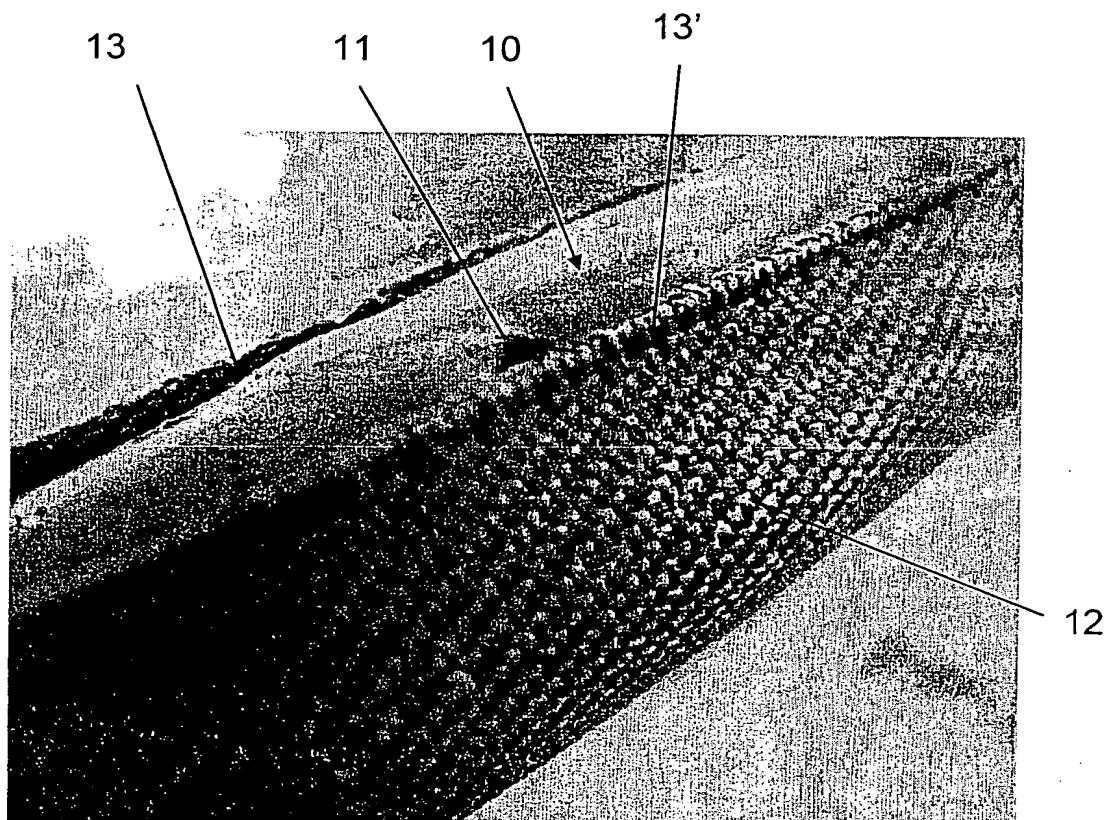


Fig. 1

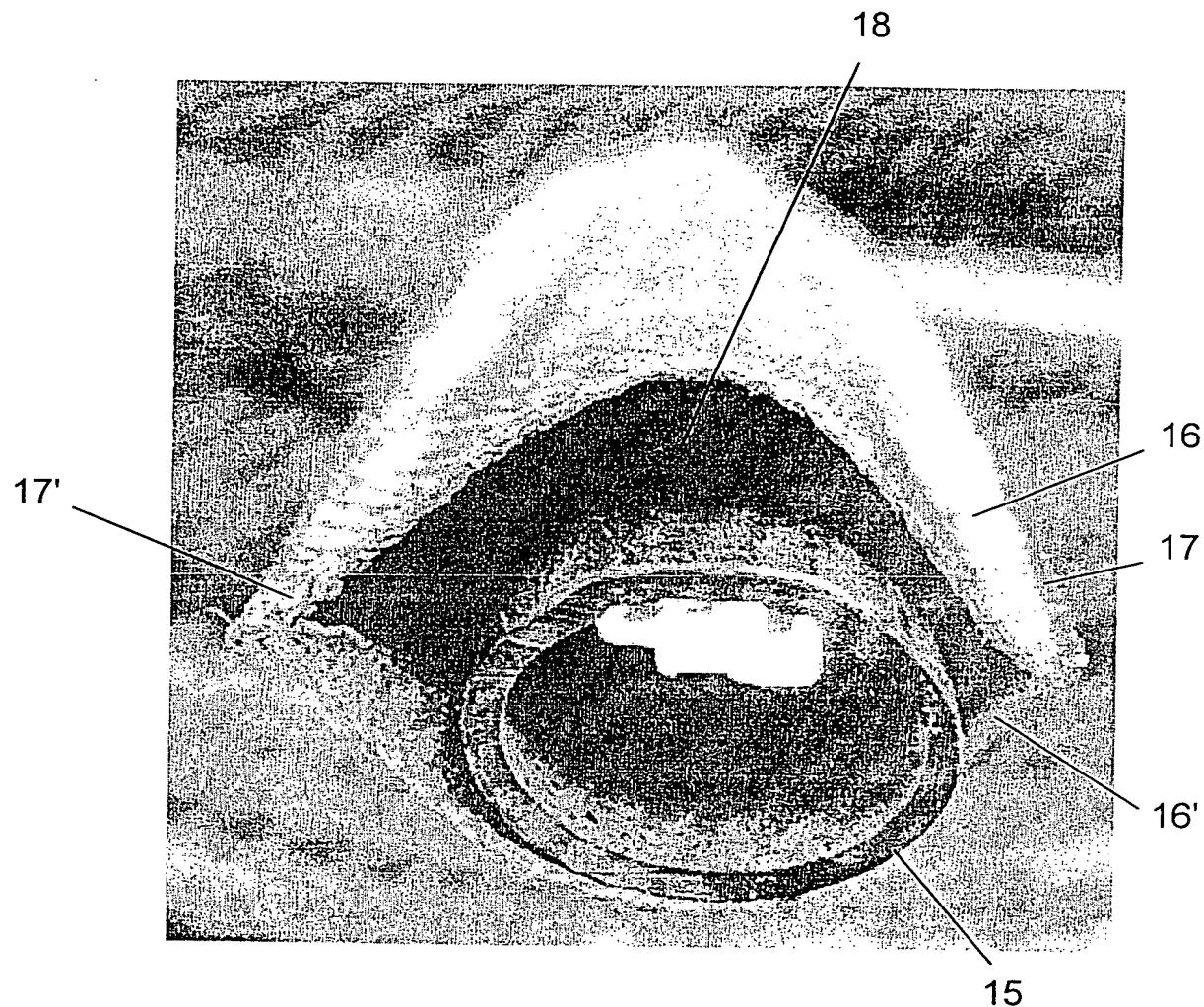


Fig. 2

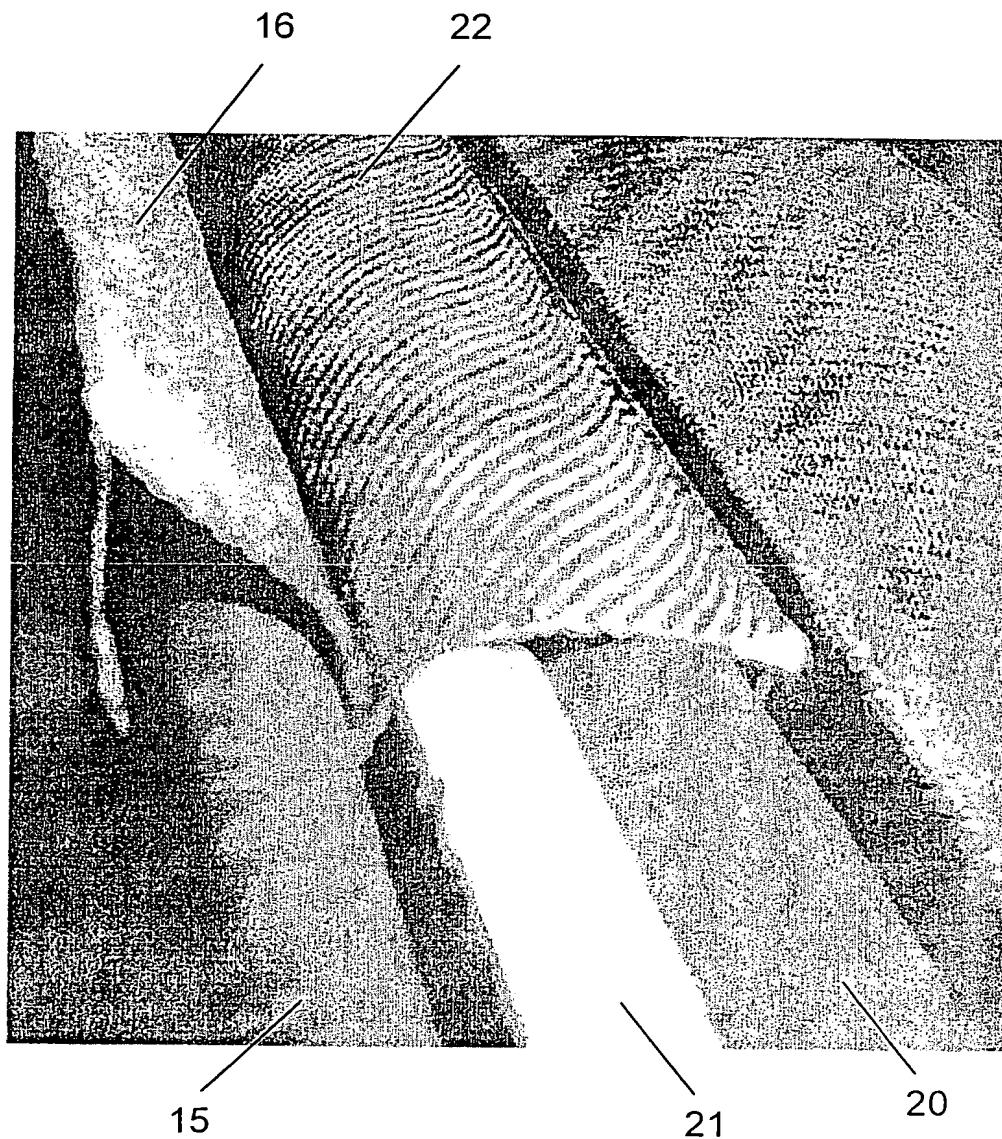


Fig. 3

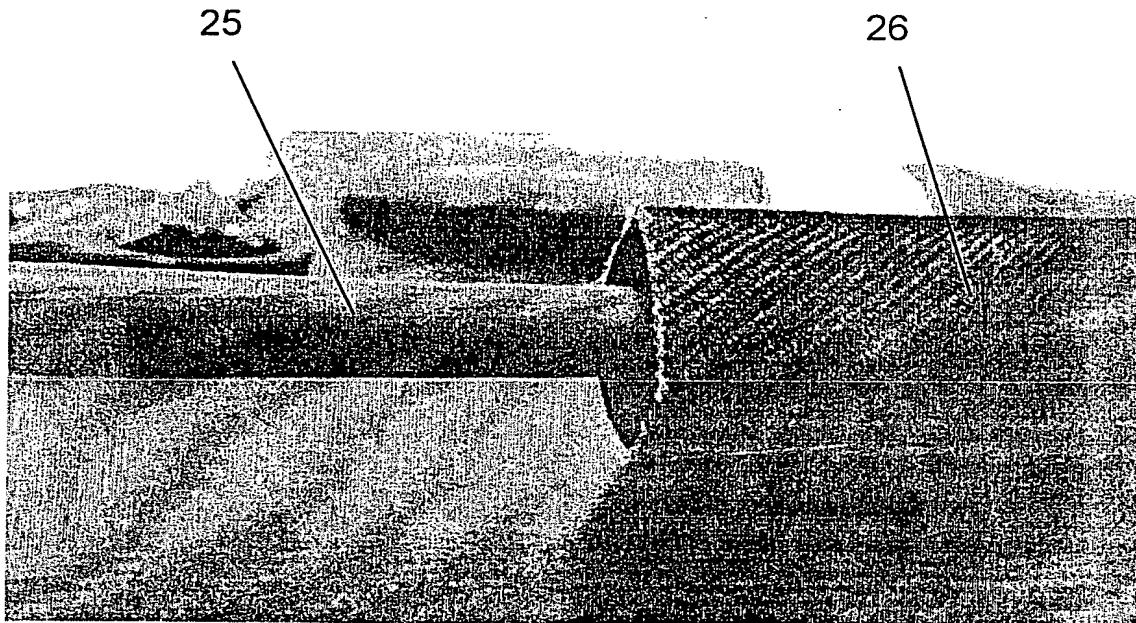


Fig. 4

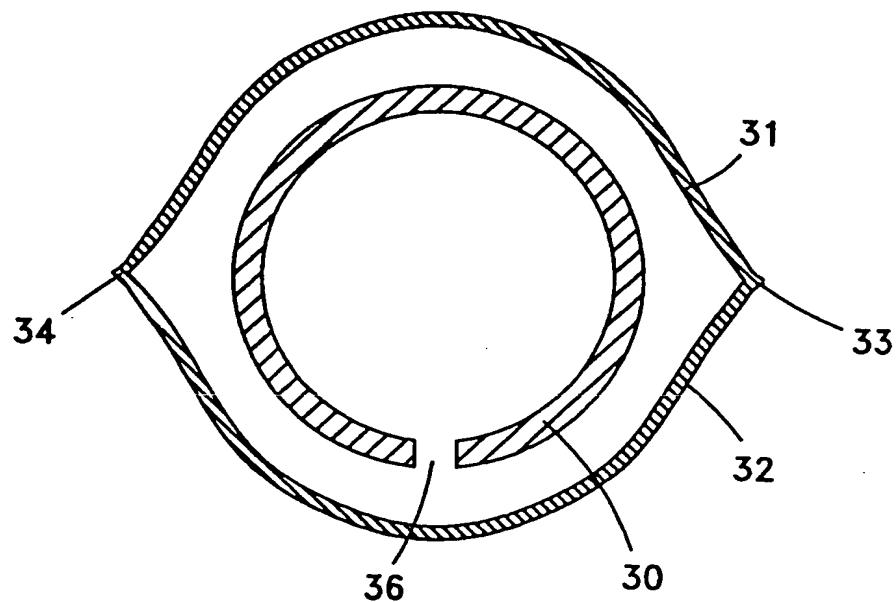


Fig. 5